

Title: Fuel Hydrocarbon Identification Test Kit

Lead PI/Affiliation: Hanby Environ.

Lab. Procedures, Inc.

Co-PI's/ Affiliations:

Date/Duration:

Initiated - 06/99

Completed - 10/99



Abstract:

Rapid Commercialization Initiative (RCI) partnership and the California Environmental Protection Agency's (Cal/EPA) Environmental Technology Certification program will evaluate the performance of the Hanby Environmental Laboratory Procedures, Inc., Hydrocarbon Identification Test Kit. The RCI program is represented by the Department of Commerce, US Army Corps of Engineers (CRREL), Naval Facilities Engineering Service Center (NFESC), US Environmental Protection Agency (NERL), State of California Environmental Protection Agency, (DTSC), State of New Jersey (DEP) and the State of New Mexico, Environmental Department.

The Hanby Environmental Laboratory Procedures, Inc., Hydrocarbon Identification Test Kit rapidly analyzes petroleum contamination of soil or water by utilizing the classic Friedel-Crafts chemical reaction to form large, colored molecules. These molecules are synthesized from normally colorless aromatic compounds such as benzene and toluene, which are typical components of gasoline and diesel. The technique uses spectroscopy in ultraviolet and infrared wavelengths to detect large stable precipitates produced by the reaction. The contaminants may be classified using these "robust", chromophoric (color-producing) molecular species which each have a distinct spectral signature. The Friedel-Crafts alkylation reaction utilizes a catalyst (e.g., AlCl_3) to attach an alkyl group to an aromatic hydrocarbon. In the Hanby test kits, an alkylhalide (e.g., carbon tetrachloride (CCl_4)) is typically used as both an extracting agent for the hydrocarbons and as a reagent. Once the catalyst is added, the reaction proceeds. The resulting color (e.g., orange, violet) provides information about the type of constituent and the intensity of the color is directly proportional (within a specific range) to concentration.

Results/Conclusions: The field screening procedure (solvent extraction and a Friedel-Crafts reaction) yielded results by the visual comparison of samples to Hanby reference photographs and spectrophotometric (H.E.L.P. Mate 2000) method were compared with a commercial off-site reference laboratory using EPA methods 8020 and 8015. The visual technique was more reliable for showing the presence and estimating the quantity of TPH contamination.

Publications:

Hewitt, A., "Evaluating the Handy Test Kits for Screening Soil and Groundwater for Total Petroleum Hydrocarbons, Field Demonstration", ERDC/CERL TR-00-7, June 2000.